

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

FARMING**22****MODEL:****M-F 36 TRACTOR****GIANT POSTER****CROP-EATING PESTS****THREE PROJECTS****FACT FILES ON:**

- ▶ Space farms
- ▶ Biological pest control
- ▶ Macronutrients
- ▶ Greening the desert
- ▶ Fish farming
- ▶ Hydroponics
- ▶ Computerised feeding systems
- ▶ Test tube cotton

INSIDE THIS PACK

FACT FILES

- ▶ The food chain
- ▶ Electronic tagging
- ▶ Animal feed additives
- ▶ Irrigation systems
- ▶ Forcing growth
- ▶ Photodegradable plastic
- ▶ The super soy bean



MODEL Make a tractor



POSTER

Crop-eating pests

PROJECTS

- ▶ Make a mini-greenhouse
- ▶ Watch a natural pest-killer
- ▶ Log local bird species



IN QUEST 23 HEALTH AND MEDICINE



FACT FILES INCLUDE:

- ▶ Bloodless surgery
- ▶ Healing forces
- ▶ Sick building syndrome
- ▶ Electronic imaging systems
- ▶ Diagnosis by computer



MODEL
The Skull

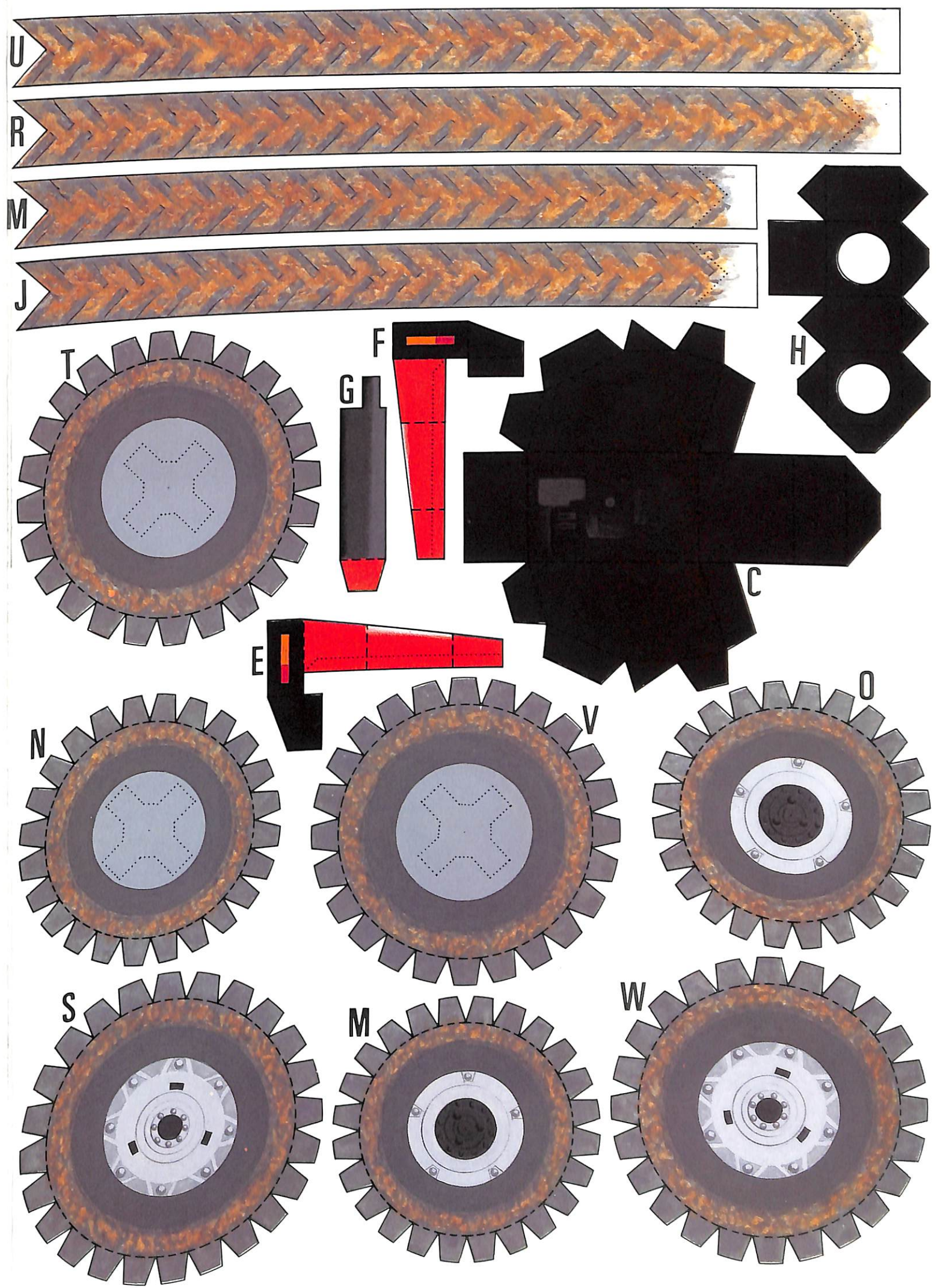
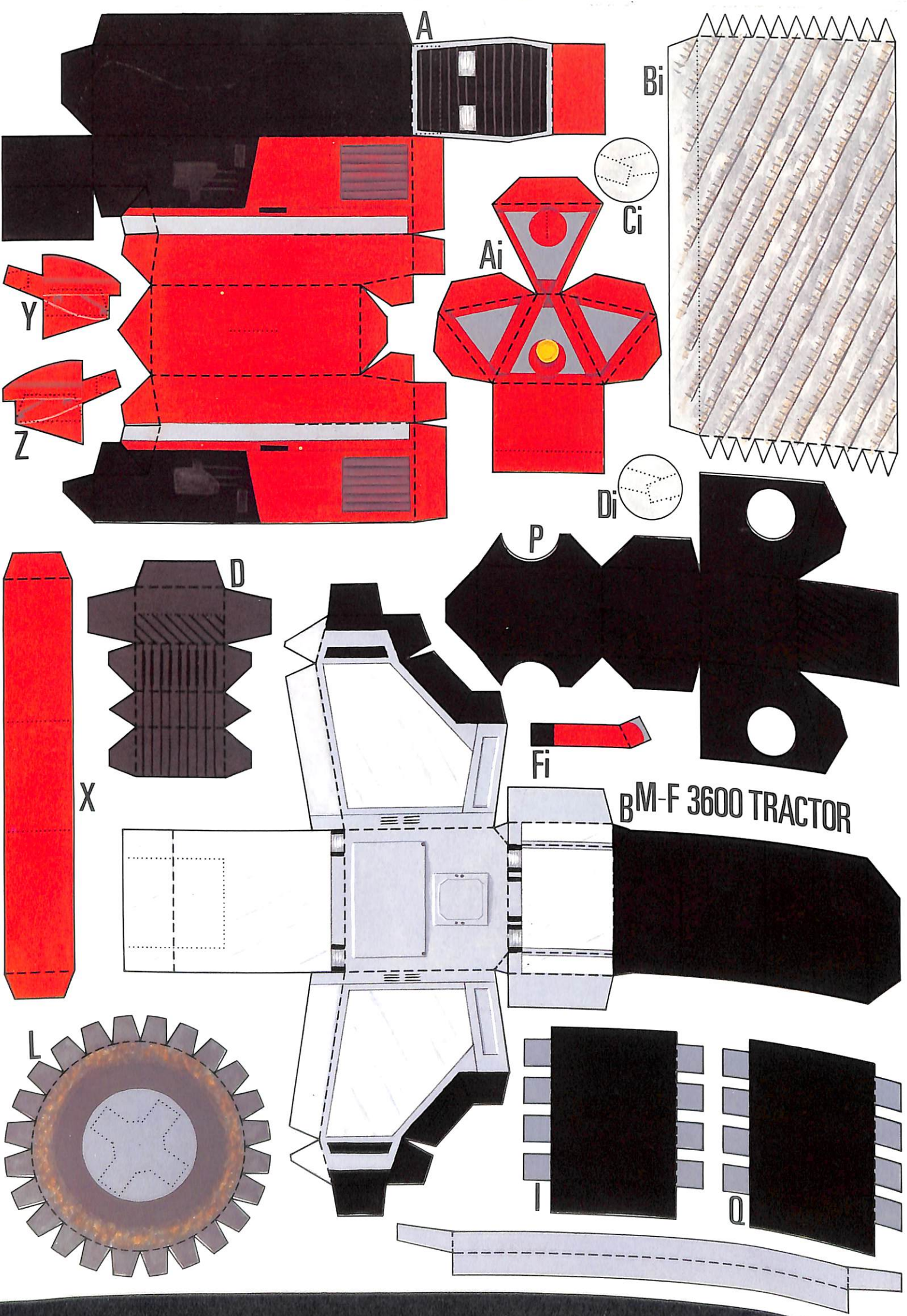


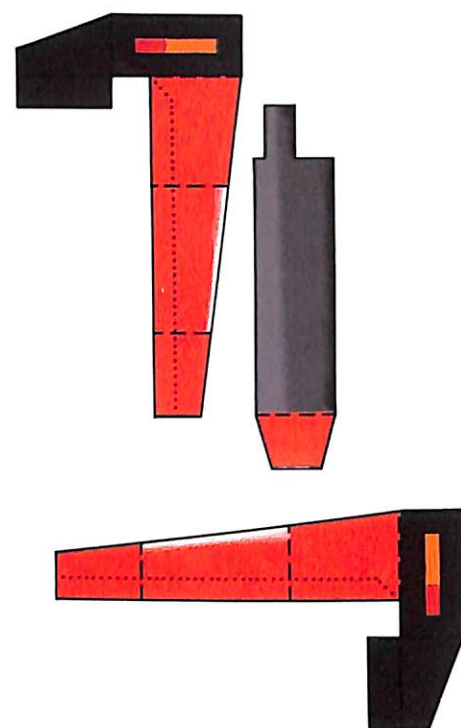
POSTER

Ambulance on wings

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THE MIGHTY MITE

This tangle of legs belongs to a spider mite, magnified 500 times. (There are actually eight legs – showing that the mite is not an insect, which would have six. In fact it is distantly related to scorpions and spiders.) There are many types of mite and they feed on the leaves of many crops – cotton, vegetables, fruit trees, and so on – causing immensely costly damage. Not all mites are bad: some feed on other types of mite and are, therefore, released on crops to eat mites like the one shown here.



The **corn rootworm** is not a worm at all but a larva – the young form of an insect or other small creature that looks quite different from the adult form. The adult rootworm is a beetle that is harmless to crops, but the larva attacks the roots of maize. Although the corncobs are not much affected, the roots' ability to support the plant is reduced – so in the first strong wind the plant falls over. The plant grows upwards again, but it cannot be properly gathered by combine harvesters. At pre-sent the rootworm is combatted by putting grains of pesticide into the soil. However, work is going ahead on breeding resistant plants. It may also be possible to modify the plants by genetic engineering: it is hoped to equip them with a gene enabling them to make a poison deadly to the rootworms.

Biophoto Associates / Science Photo Library

UNDERGROUND THREAT



Like a sci-fi alien, a grain weevil emerges from a wheat grain. The grain weevil is a type of beetle about 3.5 mm long, using its long snout, it bores through the grain's coat to get at the kernel. The female lays up to 200 eggs in a lifetime, each in a separate wheat grain, where the young weevil develops.

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SMALL CREATURES WITH BIG APPETITES

Possibly as much as one-third of the world's potential food production is lost to mankind each year. That figure rises to an amazing 54 per cent for sugar cane and 47 per cent for rice. These losses are due to weeds, diseases – and pests. Thousands of species of insects, mites and other small animals compete with us for our food crops. Some crops they eat, still more they damage or infect with disease. Locusts are spectacular examples: swarms of hundreds of millions of individuals periodically devastate the crops of vast areas of Africa and Asia.

Chemical pesticides are still the main weapons against crop pests, but alternatives are always being sought because of the harmful long-term effects that insecticides frequently have.

Increasingly, pests are attacked in IPM (integrated pest management) programmes, in which crop types, planting times, natural enemies of the pests and carefully selected pesticides are combined. Chemicals called pheromones, which pests produce to 'signal' to each other, can even be sprayed on crops to give the pests false 'messages' that encourage them to go away.

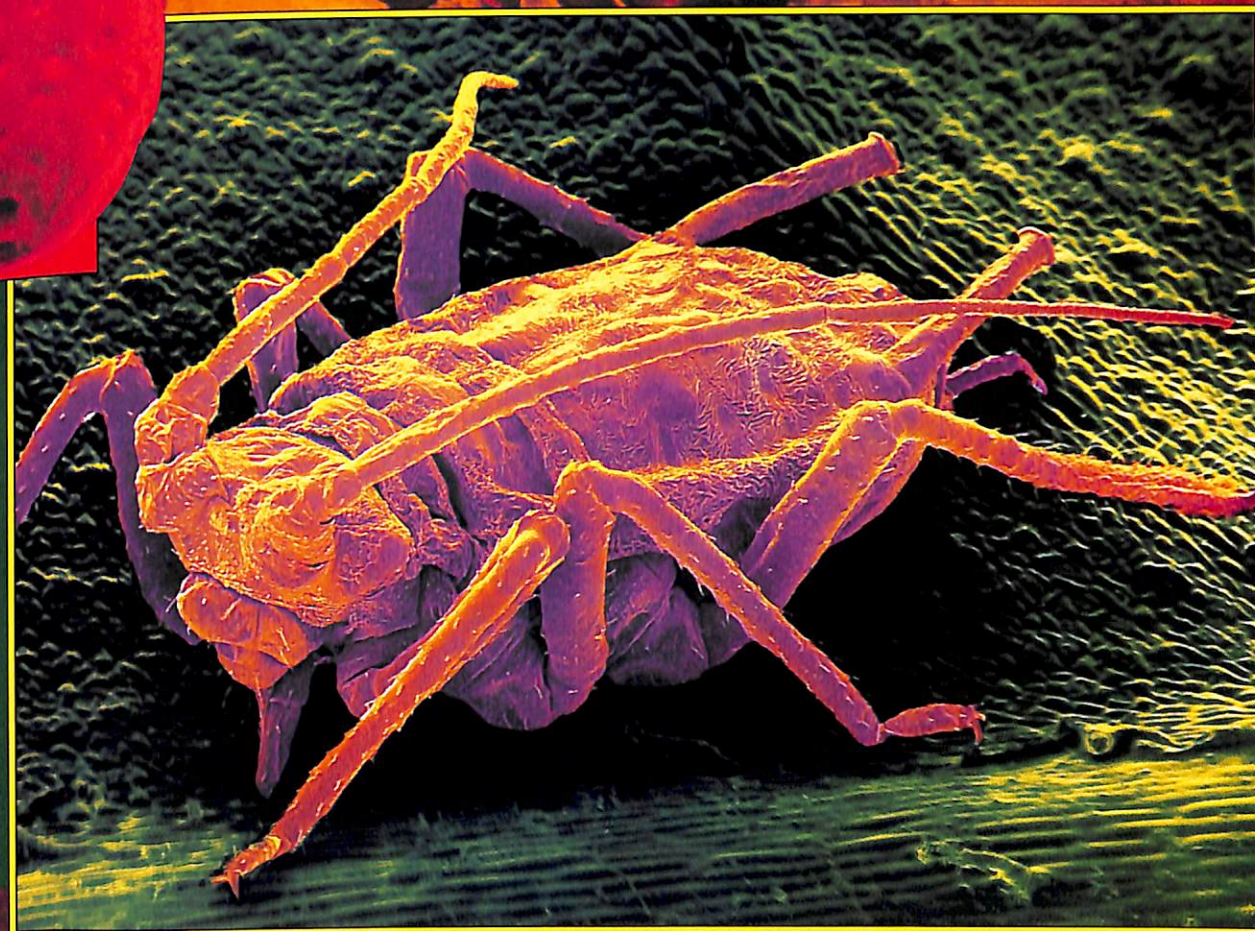
● World expenditure on insecticides:

Over \$6 billion per year. The worst-affected crops (1985 figures) are: cotton (\$969 million per year spent on insecticides); rice (\$633 million); maize (\$456 million).

● **Locust plague:** 10 million hectares of Africa were infested with locusts in 1988, the worst outbreak for 30 years; the cost was well over \$100 million.

VIRUS CARRIER

There are over 3,500 species of aphid, each favouring one or a few species of plant. For example, the **peach potato aphid** (here magnified 100 times) lays its eggs on peach trees, where they spend the winter. The young winged aphids migrate to other plants, such as potatoes, in the summer. The aphid does some of its damage with the tube in its mouth, called a stylet, with which it sucks sugary fluids from leaves – but it does even greater damage by spreading many types of plant viruses. When an aphid is eaten by a ladybird its last act is to warn other aphids of danger by squirting special chemicals (pheromones) from the tubes at the back of its body. Farmers can turn this to advantage by spraying similar alarm substances no crops to drive aphids away.



Dr Jeremy Burgess / Science Photo Library

THE DESTROYERS

CROP-EATING PESTS UNDER THE MICROSCOPE